Total No. of Questions : 4]

SEAT No. :

**P5189**

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# B.E. (Computer Engineering) (Insem)
# DESIGN AND ANALYSIS OF ALGORITHMS
# (2019 Pattern) (Semester-VII) (410241)

*Time : 1 Hour]* *[Max. Marks : 30*

***Instructions to the candidates:***

1) ***Answer the questions Q.1 or Q.2; Q.3 or Q.4.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indictae full marks.***
4) ***Assume suitable data, if necessary.***

***Q1)*** a) Given the fastest computer and hypothetically infinite memory, do we still need to study algorithms? Justify. **[2]**

b) How can we related algorithms to technology? Briefly explain. **[6]**

c) Consider an array A of n integers which are already in sorted order. Let x be the number being searched in the array A in a liner fashion. The code fragment performing this task is given below: **[7]**

```
int lin _ search (int A [])
{
    i=0; flag=0;
    do { if (x = = A [i]) then
        return (1); // Number found
        else
            i++;
    } while (i<n);
    return (0); // Number not found.
}
```

i) Is this code fragment efficient? (We wish to use linear search only). Justify your answer.

ii) Does it attribute to any design issue with respect to iterative algorithm? Briefly explain.

OR

***P.T.O.***

***Q2)*** a) What is iterative algorithm? Explain interative algorithm design issues using suitable examples. **[8]**

b) Consider the following algorithm to find the square of a number:

```
int sqr(int n)
    {
        if (n= = 0) return 0;
        else return (2n+sqr(n-1)-1)
```

Prove the correctness of this algorithm using principle of mathematical induction or otherwise. **[7]**

***Q3)*** a) Briefly explain P and NP problems in the context of complexity theory. Give suitable example. **[8]**

b) If f (n)=O(g(n)) then does it imply g(n)=O(f(n))? Discuss. **[5]**

c) Comment on the statement "Best case analysis of algorithm may not give clear idea of performance" **[2]**

OR

***Q4)*** a) What is SAT AND 3-SAT problem? Prove that 3-SAT problem is NP complete. **[8]**

b) What to do you understand by best case, worst case and average-case behaviour of an algorithm? Is an average case efficiency an average of best-case, worst-case efficiencies? Justify answer. **[7]**